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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/506,481 | 07/13/2005 | Catherine Callens | 12928/10018 | 2819 |

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| EXAMINER | |
|---|---|
| PALABRICA, RICARDO J | |
| ART UNIT | PAPER NUMBER |
| 3663 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 03/02/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/506,481 | CALLENS ET AL. | |
| | Examiner | Art Unit | |
| | Rick Palabrica | 3663 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *07 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *14-25* is/are pending in the application.

4a) Of the above claim(s) *23-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. Applicant's election with traverse of Group I, drawn to a process (designing a nuclear fuel assembly). Applicant alleges that claims 1-22 read on the elected invention. The examiner notes that applicant himself canceled claims 1-13 in his 9/1/2004 Preliminary Amendment. Accordingly, only claims 14-22 are examined in this Office action.

2. Applicant traversed the restriction requirement in the 1/4/07 Office action on the ground that Groups I, II and III of his claimed invention meet the Unity of Invention requirement. The examiner disagrees. Applicant's inventions listed as Groups I, II and III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the general inventive concept set forth, for example, in claims such as claim 14, does not define over the teachings of the prior art set forth, for example, in Bezold et al. (U.S. 3,562,109), as discussed below.

The restriction requirement is still deemed proper and is therefore made **FINAL**.

### *Drawings*

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the progression of the falling speed of the control rod in the lower damping portion using BOTH a HIGHER value AND a LOWER value for the radial passage gap must be shown or the feature(s)

canceled from the claim(s). See, e.g., claim 16, and note that Figs. 6 and 7 each show only a single curve that is vague as to what radial passage gap value said curve depicts. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to because: a) Figs.5 and 6 contain words that are not in the English language; b) boxes 34, 36, 38 and 40 in Fig. 4 are not identified; and c) boxes 43, 49 and 57 in Fig. 5 are not identified. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 14-18 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Steps 50, 52, 54, 56 and 58 critical or essential to the

practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

The specification discloses Fig. 5 as illustrating the successive steps of the claimed design method (see page 6, lines 1+ of the specification). Additionally, applicant himself admits that the fuel assembly has been designed "in order to take into consideration the specific stresses brought about in the assembly by the fall of the control cluster 4 during such a shutdown of the reactor (see page 9, lines 25+ of the specification). These stresses include those, e.g., on the spring (see step 54).

The claims recite only steps 42, 44, 46 and 48 shown in block diagram form in Fig. 5 and described on page 10, line 16 through page 14, line 26 of the specification. The remaining critical or essential steps 50, 52, 54, 56 and 58, as shown in Fig. 5 and described on page 14, line 27 through page 18, line 24 of the specification, are not included in the claims.

6. Claims 14-18 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are steps 50, 52, 54, 56 and 58, as shown in Fig. 5.

7. Claims 14-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 14 recites the limitation, "each of the guide tubes comprising a lower damping portion which comprises at least a portion of reduced inside diameter." Underlining provided. The claim is vague, indefinite and incomplete and its metes and bounds cannot be determined as to which portion of the lower damping portion has the so-called reduced inside diameter. For example, is it the lower portion, the middle portion, the upper portion of the lower damping portion, or what?

Claim 17 recites, "wherein the higher value is a maximum statistical value for the passage gap (J)." The phrase, "a maximum statistical value" implies there is a plurality of maximum statistical values. The claim is vague, indefinite and incomplete, and its metes and bounds cannot be determined as to which of these maximum values applicant applies to his method. The Federal Circuit could not have been clearer on this matter when it cautioned:

> *"This court has repeatedly emphasized that an indefinite article 'a' or 'an' in patent parlance carries the meaning of 'one or more' in open-ended claims containing the transitional phrase, 'comprising,'" KCJ Corp v. Kinetic Concepts, Inc.,* 223 F.3d 1351, 1356 (Fed. Cir. 2000).

Claim 18 recites, "wherein the lower value is a minimum statistical value for the passage gap (J)." The phrase, "a minimum statistical value" implies there is a plurality of minimum statistical values. The claim is vague, indefinite and incomplete, and its metes and bounds cannot be determined as to which of these minimum values applicant applies to his method.

Claim 19 recites in line 5 the limitation "the progression". There is insufficient antecedent basis for this limitation in the claim.

Claim 19 recites in lines 10 and 11 the limitation, "establishing, based on the maximum load for compression, at least a maximum shearing stress in the spring." Underlining provided. The claim is vague, indefinite and incomplete, and its mete and bounds cannot be determined. The term "at least" means the minimum of a range of values. It is impossible to have a minimum value for the shearing stress when only a single value of stress (i.e., the maximum) is defined. One cannot have a minimum stress value that is also a maximum stress value.

Claim 21 recites the limitation "the longitudinal center" in line 2. There is insufficient antecedent basis for this limitation in the claim.

***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 19-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 9-13 of copending Application No. 10/506,360. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are identical/similar. The figures in the instant application and 10/506,360 are identical. The specification of the instant application (e.g., from page 10 through page 22) is identical to the specification of application 10/506,360 (e.g., from page 7 through page 19)., as well as their specifications and figures

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bezold et al. (U.S. 3,562,109), who teach an apparatus and method for optimum braking of a control rod for a nuclear reactor.

They teach a water cooled reactor having a plurality of control rods 1 that are each received in a guide tube 2 having a lower portion 3 of reduced diameter (see Figs.

1 and 2). Their control rod has a radial passage gap (i.e., gap between control rod portion 11' and guide tube portion 3) when the rod is introduced in the guide tube.

They teach a provision for a hydraulic fall brake of the control rods that precludes damage of the rods and high degree of mating between a rod and a guide tube, when the control rods are dropped into the reactor core (see col. 1 lines 31+). Their design is similar to applicant's case of providing constriction on the lower end of the guide tube (see Fig. 1 and col. 2, lines 4+). Thus, the configuration of the control rod/guide tube combination of Bezold et al. reads on the structure recited in the preamble of the claims.

As part of the design and optimization process of their apparatus, Bezold et al. establish the slowdown force experienced by a control rod as it travels down the guide tube (see Fig. 3b that depicts shutdown force, g, as a function of time, t). They optimize the braking action to achieve a constant slow-down or retardation by adjusting the radial passage gap between rod portion 11' and guide tube portion 3. See col. 3, lines 28+.

As to claim 14, it is evident from the Bezold et al. description, especially from their Fig. 3b, that their design process includes applicant's claimed steps of: a) establishing a falling speed of the control rod upon entry into the lower damping portion; b) establishing a progression of the falling speed; c) establishing the maximum elevated pressure in the fluid in the lower damping portion. The braking force as a function of time in Fig. 3b inherently establishes the falling speed of the control rod as a function of

time, as well as the pressure of the fluid in the lower damping portion, because both parameters determine the braking force experienced by the falling rod.

As to the maximum circumferential stress on the guide tube, as recited in claims 14 and 15, this parameter is inherently not exceeded in Bezold et al.'s design. If said stress is exceeded, then Bezold et al. would not have an operable apparatus. The issuance of a patent to Bezold et al. is objective evidence that their apparatus is operable.

As to claims 16-18, Bezold et al. teach that optimizing the braking or damping action for their apparatus can be achieved by varying the radial gap between the control rod and damping portion (see col. 4, lines 1+). Applicant's claim language: a) "higher value" reads on the highest value of the gap in said optimization process; and b) "lower value" reads on the lowest value of the gap in said optimization process.

10. Claims 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bezold et al. in view of either one of Canat (U.S. 5,076,995) or Kunzel (U.S. 3,762,994). Bezold et al. disclose the applicant's claim limitations except for the helical spring.

Either one of Canat or Kunzel teaches the use of a helical spring (e.g., see spring 34 in Fig. 1 of Canat or spring 51 in Fig. 1 of Kunzel) to dampen the impact of the control rod support against an upper end piece (e.g., see element 24 in Canat or element 43 in Kunzel). This spring provides a shock absorbing means and improves

stress distribution in a control rod assembly (e.g., see col. 1, lines 64+ in Canat or col. 2, lines 65+ in Kunzel).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus, as disclosed by Bezold et al., by the teaching of either Canat or Kunzel, to include a helical to gain the advantages thereof (i.e., further shock absorbing means), because such modification is no more than the use of a well known expedient in the nuclear art. (Examiner's note: Bezold et al. teaches that spring dampers can be dispensed with (see paragraph bridging cols. 3 and 4). Clearly, eliminating such spring mechanism is an option and not a requirement . Including a spring in their apparatus would contribute to extending the life of the control rod by further reducing the stresses it experiences during reactor shutdown).

The combination of Bezold et al. with either one of Canat or Kunzel results in an apparatus whose configuration that reads on the applicant's apparatus described in the preamble of claim 19.

Bezold et al.'s design method, as described in section 9 above, teaches establishment of the progression of the speed of the control rod and ensuring that stresses in the system (e.g., damping section) are not exceeded. Such teaching cannot be ignored for the case of stresses in a helical spring, which provides the same shock absorbing function as the damping section.

One having ordinary skill in the art at the time the invention was made would have recognized it advantageous to further apply Bezold et al.'s method to the apparatus in either one of the Bezold et al.-Canat or Bezold et al.-Kunzel combination

to: a) establish the progression of the speed of the control cluster after impact with the upper end piece; b) establish a maximum longitudinal load for the compression of the spring; and c) establish a maximum shearing stress in the spring, because such modification is an obvious extension of said method.

As to claims 20 and 21, applicant himself admits that the shearing stress is maximum along axes FN and F2 of the spring. The Bezold et al.-Canat or Bezold et al.-Kunzel apparatus inherently meets these limitations because the spring in either apparatus must be capable of withstanding the highest stress to be operable. If said stress is exceeded, then the teaching in either Canat or Kunzel would not result in an operable apparatus. The issuance of a patent to either Canat or Kunzel is objective evidence that their apparatus, each one including a helical spring, operates.

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References B-D further illustrate prior art.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 571-272-6880. The examiner can normally be reached on 6:00-4:30, Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RJP
February 28, 2007

RICARDO J. PALABRICA
PRIMARY EXAMINER